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[FAD 16: Foodgrains, Starches and Ready to Eat Foods]

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Indian Standard

BAKERY PRODUCTS — METHODS OF SAMPLING

UDC 664 : 620·113

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

March 1990

Price Group 3

Methods for Sampling of Food Products and Agricultural Inputs Sectional Committee, BSD 4

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards on 26 July 1989, after the draft finalized by the Methods for Sampling of Food Products and Agricultural Inputs Sectional Committee had been approved by the Basic Standards, Systems and Services Division Council.

The bakery industry is a well organized and established industry in India. With the considerable increase in the consumption of bakery products, a strong need has been felt for stricter quality control and evolving uniform methods of sampling which will help in proper and objective evaluation of various characteristics of different bakery products.

The sampling procedures given in this standard include, besides lot inspection plans, recommended provisions for process control for the guidance of the manufacturers. Proper quality control during process would substantially reduce quality fluctuations and help a manufacturer in achieving in-built quality of product. Lot inspection plan would enable the manufacturer or purchaser or other independent inspection and testing agencies to decide the conformity or otherwise of a lot of bakery products to the requirements of the relevant material specifications.

This standard lays down methods of sampling for bakery products. The bakery products have been classified into the following three homogeneous groups for the purpose of sampling:

i) Biscuits, wafers, bread rusks and ice cream cones,

ii) Breads and buns, and

iii) Cakes.

A separate sampling plan has been prescribed for each of these groups.

The committee responsible for preparing this standard felt that the sampling plans for these three groups of bakery products evolved on the basis of statistical analysis of the relevant data would be more realistic and easily implementable. Hence, a large amount of data for various characteristics of bakery products was statistically analysed and minimum sample sizes were estimated on the basis of 95 percent confidence level and maximum coefficient of variation. The lot sizes are based on the current practices of trade and industry. The number of tests and criteria for conformity are based on a variety of considerations including variation in the test results, importance of a characteristic from the view point of end use of the product, cost of testing, time of testing and quality protection desired.

This standard is subject to the restrictions imposed under *PFA Act 1954* (including the rules framed thereunder) and *Standards of Weights and Measures* (*Packaged Commodities*) *Rules, 1977*, wherever applicable.

In reporting the results of a test or analysis, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

BAKERY PRODUCTS — METHODS OF SAMPLING

1 SCOPE

1.1 This standard prescribes the methods of sampling and criteria for ascertaining the conformity of a lot of bakery products to the relevant product specifications, such as, biscuits, breads and cakes. It also includes the recommended provisions for process control for the guidance of manufacturers.

2 REFERENCES

2.1 The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 GENERAL REQUIREMENTS OF SAMPLING

3.0 In drawing, preparing, storing and handling samples, the following precautions and directions shall be observed.

3.1 Sample shall be taken in a protected place which is free of odour and not exposed to damp air, dust or soot.

3.2 Precautions shall be taken to protect the samples, the lots being sampled, the sampling instrument and the containers for samples from adventitious contamination.

3.3 The samples shall be placed in air tight, clean and dry glass, metallic containers suitably lacquered or lined and stored in such a manner that the material is not unduly affected.

3.4 Each container containing the samples shall be marked with full details of sampling, such as, date and time of sampling, batch or code number, name of the manufacturer and other relevant particulars.

3.5 The samples shall be stored at room temperature.

3.6 Sampling shall be done by a person agreed to between the purchaser and the vendor, and if desired by them, in the presence of the purchaser (or his representative) and the vendor (or his representative).

3.7 Unless otherwise agreed to between the purchaser and the vendor, sampling shall be done at the bakery.

3.8 Samples shall be tested within as short a time as possible after their drawl, preferably within 24 hours of sampling.

4 PROCESS CONTROL

4.1 It is recommended that the manufacturer of bakery products follows the hygienic and sanitary conditions given in IS 2491 : 1972 and IS 5059 : 1969.

4.2 In order to ensure the quality of finished product, proper checks shall be exercised on raw materials and at different stages of processing. The following stages of inspection along with the frequency of inspection are recommended for various characteristics of some of the bakery products, such as biscuits, breads and cakes.

4.2.1 *Biscuits*

Sl No.	*Stage of Inspection*	*Characteristics to be Checked*	*Recommended Frequency of Checking*
1	Ingredients	a) Flour — *see* IS 7463 : 1938	Each consignment/ batch
		b) Fat or shortening — *see* IS 10633 : 1986 or IS 10634 : 1986	do
		c) Sugar — *see* IS 5982 : 1970	do
2	Preparation of ingredients	Correct weight of each major ingredient	Twice a shift
3	Creaming of fat, sugar, additives and mixing of dough	Homogeneity, consistency and machinability	Each batch
4	Relaxing of dough, if required	Proper relaxation of dough	do
5	Feeding of the dough into hopper	Uniform feeding of dough pieces into the machine	Constantly
6	Moulding and cutting	Raw weight of the biscuits	Twice a shift
7	Baking	a) Heat profile	Twice a shift
		b) Baking time	do
8	Cooling	a) Cooling the product so that it becomes fit for handling and packing	do
		b) Weight, gauge and colour	Twice a shift

Sl No.	*Stage of Inspection*	*Characteristics to be Checked*	*Recommended Frequency of Checking*
9	Packing	a) Correct weight of packet	Every half an hour
		b) Moisture	At the beginning, middle and end of each shift
		c) Other than moisture — *see* IS 1011 : 1981	One sample of each variety every day
		d) Declaration on the wrapper shall meet statutory requirements	
4.2.2 *Breads*			
1	Procurement of ingredients	a) Flour — *see* IS 7464 : 1974	Each consignment
		b) Yeast — *see* IS 1320 : 1972	do
2	Preparation and mixing of ingredients	a) Correct temperature of water and correct weight of each ingredient	Each batch
		b) Consistency of dough as well as dough temperature	do
		c) Yeast to be tested preferably before usage — *see* IS 1320 : 1972	
3	Fermentation, if necessary		
	a) First fermentation	Fermentation conditions	Every half an hour
	b) Knock back/remixing	During knock back ensure that no large air pockets remain in the dough	Each batch
	c) Second fermentation	Fermentation conditions	Every one hour
4	Dividing	Correct weight of dough pieces	Every 5-10 minutes
5	Rounding	Smoothening of each dough piece	Regular pre-determined intervals
6	Intermediate proofing	a) Relaxation time	do
		b) Dough pieces falling in the individual pockets of interprover	do
7	Moulding	Each individual piece is tightly moulded so that seams do not open-up	do
8	Final proofing	a) Temperature and humidity	Every one hour
		b) Proof time	do
9	Baking	a) Temperature of baking chamber	Every half an hour
		b) Baking time	do
10	Cooling	Correct crumb temperature for slicing	Every one hour
11	Slicing	Sharpness of blades	Regular pre-determined intervals
12	Wrapping	a) Tight wrapping of bread	do
		b) Declaration on the wrapper shall meet statutory requirements	
4.2.3 *Cakes*			
1	Ingredients	a) Flour — *see* IS 9194 : 1979	Each consignment
		b) Fat — *see* IS 10633 : 1983	do
		c) Sugar — *see* IS 1151 : 1969 or IS 498 : 1970	do
2	Whisking of eggs and sugar with flavours	Proper aeration and temperature of mix	Each batch
3	Beating of flour and fat	Proper aeration and temperature	do
4	Amalgamation of whisked eggs to beaten flour-fat mass	a) Even amalgamation of the two mixtures	do
		b) Check against over mixing	do

Sl No.	*Stage of Inspection*	*Characteristics to be Checked*	*Recommended Frequency of Checking*
5	Addition of remaining flour, leavening agents, etc	a) Consistent mixing	Each batch
		b) Specific gravity of batter	Twice a shift
6	Depositing cake batter in moulds	a) Correct weight of batters	Each batch
		b) Proper levelling	do
7	Baking	a) Temperature of baking chamber	do
		b) Baking time	do
8	Cooling	Proper cooling	Constantly
9	Slicing	a) Proper sharpness of blades before slicing	do
		b) Evenness of slices	do
10	Packing	a) Weight of each packet	Every half an hour
		b) Statutory requirements	do

5 LOT INSPECTION

5.1 If the manufacturer has maintained an adequate and satisfactory system of quality control in the manufacture of bakery products, the resulting data and information may be made available to the purchaser along with the material supplied to enable him to judge the acceptability or otherwise of the consignment. When it is not possible to provide this information, or if the purchaser so desires, the procedure laid down in the following clauses shall be followed for determining the conformity of the material to the requirements of the specification.

5.2 Group I Biscuits, Wafers, Bread Rusks and Ice Cream Cones

5.2.1 *Scale of Sampling*

5.2.1.1 *Lot*

All the containers in a single consignment belonging to the same batch of manufacture shall constitute a lot.

5.2.1.2 For ascertaining the conformity of the material to the requirements of the specification, samples shall be tested from each lot separately.

5.2.1.3 The number of containers to be sampled from a lot shall depend upon the size of the lot and shall be in accordance with Table 1.

Table 1 Number of Containers to be Selected

(*Clauses* 5.2.1.3 *and* 5.2.2.1)

Lot Size (1)	Sample Size (2)
Up to 50	3
51 to 150	4
151 to 300	5
301 to 500	6
501 to 1 000	8
1 001 and above	10

5.2.1.4 The containers shall be selected from the lot at random and to ensure the randomness of selection, procedures given in IS 4905 : 1968 may be followed.

5.2.2 *Test Samples and Referee Samples*

5.2.2.1 From each lot, draw the number of containers of biscuits as given in col 2 of Table 1. These containers shall be opened and mixed. From each selected container, about 600 g of biscuits shall be taken from different packets/portions. This quantity of 600 g shall be, after proper mixing, divided into two equal parts of 300 g biscuits each. The first part of 300 g shall be divided into three equal parts of 100 g each. One of them shall be for the purchaser, another for the vendor and the third for the referee. These biscuits shall be packed in air tight dry containers and labelled with the particulars as given in **3.4**. Each of these containers of 100 g shall constitute individual test sample. These individual test samples shall be separated into three identical sets of test samples in such a way that each set has a sample representing each selected container.

5.2.2.2 The second part of 300 g shall be suitably powdered and divided into two equal parts of 150 g each. While powdering the biscuits, the following precautions shall be observed:

a) A sample of plain biscuits shall be ground as quickly as possible.

b) The cream, chocolate, jam, jelly or any other filling between biscuits should be removed by gently scraping before powdering the sample.

c) As far as possible, the coating and fillings should be removed before powdering the biscuits.

d) As the biscuits are highly hygroscopic, the preparation of the sample should be done very quickly, preferably in a closed and dry place.

5.2.2.3 Out of these two portions of 150 g each, the first portion shall be divided into three equal parts of 50 g each. These parts shall be transferred immediately to clean, air tight and dry containers which are then sealed and labelled with the particulars as given in **3.4**. Each of these sample containers of 50 g shall constitute individual test sample to be tested for moisture.

These individual moisture shall be separated into identical sets of test samples in such a way that each set has a sample representing each selected container. One of these sets shall be marked for the purchaser, another for the vendor, and the third for the referee.

5.2.2.4 Out of the second portion of 150 g, approximately equal quantity of material shall be taken from each container selected from the lot. It shall be thoroughly mixed so as to constitute the composite sample of not less than 450 g. This shall be divided into three equal parts. These parts shall be transferred to clean, air tight and dry containers which are then sealed and labelled with all the particulars given in **3.4**. One of them shall be for the purchaser, another for the vendor and the third for the referee.

5.2.2.5 Referee samples shall consist of a set of individual test samples (*see* **5.2.2.1**), a set of individual moisture samples (*see* **5.2.2.3**) and the composite sample (*see* **5.2.2.4**) and shall bear the seals of the purchaser and the vendor. These shall be kept at a place agreed to between the two so as to be used in case of a dispute.

5.2.3 *Number of Tests and Criteria for Conformity*

5.2.3.1 The general requirements shall be tested on each of the individual test samples (*see* **5.2.2.1**).

5.2.3.2 The moisture content shall be tested on individual moisture samples (*see* **5.2.2.3**).

5.2.3.3 Tests for the determination of remaining characteristics, such as, acid insoluble ash and acidity of extracted fat shall be conducted on the composite sample (*see* **5.2.2.4**).

5.2.3.4 The lot shall be declared as conforming to the requirements of the relevant material specification if all the test results on individual and composite samples meet the relevant specification requirements.

5.3 Group II Breads and Buns

5.3.1 *Scale of Sampling*

5.3.1.1 *Lot*

All the loaves of bread/buns, in a single consignment, of the same type and belonging to the same batch of manufacture, not exceeding 10 000 loaves shall constitute a lot.

5.3.1.2 For ascertaining conformity of the material to the requirements of the relevant material specification, samples shall be tested from each lot separately.

5.3.1.3 The number of loaves of breads/buns to be tested from a lot shall depend on the size of the lot as given in col 1 and shall be in accordance with col 2 and 3 of Table 2.

5.3.1.4 The loaves/buns shall be selected from the lot at random. In order to ensure the randomness of selection, procedures of simple random sampling or systematic sampling as given in IS 4905 : 1968 may be followed.

Table 2 Number of Loaves of Breads/Buns to be Selected

(*Clauses* 5.3.1.3, 5.3.1.5, 5.3.2.1 *and* 5.3.2.2)

Number of Loaves in the Lot	Sample Size	
	For Visual, Volume/Mass Ratio and Mass n_1	Chemical Analysis n_2
(1)	(2)	(3)
Up to 1 000	5	3
1 001 to 3 000	8	3
3 001 to 5 000	13	6
5 001 to 10 000	20	9

5.3.1.5 The number of loaves/buns given under col 2 and 3 of Table 2 combined together (that is n_1+n_2) shall be selected at random from a lot and then randomly divided into two groups so that the number of loaves/buns given in col 2 and 3 are obtained separately.

5.3.2 *Test Samples and Referee Samples*

5.3.2.1 Loaves buns selected according to **5.3.1.3** as given under col 2 of Table 2 shall constitute test samples for visual examination, volume/mass ratio and mass.

5.3.2.2 For each of the loaves/buns selected from the lot according to col 3 of Table 2, the individual sample for testing total solid content and crude fibre shall be prepared according to the procedure given in **5.3.2.3** and **5.3.2.4**.

5.3.2.3 In case of loaves/buns weighing up to 400 g, the contents shall be cut into small pieces with the help of a clean, dry scissor or a sharp edged knife and further ground in an electrically driven dry blender, taking care that sample temperature does not rise above 45°C in the entire operation. From this, the quantity of material required for testing total solid content and crude fibre shall be taken so as to constitute the individual sample.

5.3.2.4 The loaves/buns of over 400 g shall be sliced uniformly into thin pieces with the help of a sharp edged knife and then two slices from the centre and two from each end shall be taken, leaving the outermost end slices. Afterwards the procedure as prescribed in **5.3.2.3** shall be followed.

5.3.2.5 The remainder of the material for each sample loaf/bun (*see* **5.3.2.3** and **5.3.2.4**) selected from a lot shall be mixed together so as to constitute the composite sample which shall be sufficient to carry out the tests for remaining requirements, such as, *p*H and acid insoluble ash as given in the specification.

5.3.3 *Number of Tests*

5.3.3.1 All the samples of loaves of breads/buns (*see* **5.3.2.1**) shall be inspected for visual requirements, mass and volume/mass ratio as given in the relevant material specification.

5.3.3.2 Tests for the determination of total solid content and crude fibre shall be conducted individually on each of the sample loaves (*see* **5.3.2.2**).

5.3.3.3 Tests for remaining requirements such as *p*H and acid insoluble ash as given in the relevant material specification shall be conducted on the composite sample (*see* **5.3.2.5**).

5.3.4 *Criteria for Conformity*

The lot shall be declared as conforming to the requirements of the relevant material specification, if the following are satisfied.

5.3.4.1 For the requirements tested on individual samples according to **5.3.2.1**, test results for each of the requirements satisfy the corresponding specification requirements.

5.3.4.2 For total solid content and crude fibre, each of the test results on sample loaves obtained according to **5.3.2.2** shall meet the corresponding specification requirements.

5.3.4.3 For remaining requirements such as *p*H and acid insoluble ash, all the test results on the composite sample shall meet the relevant specification requirements.

5.4 Group III Cakes

5.4.1 *Scale of Sampling*

5.4.1.1 *Lot*

All the cakes, in a single consignment, of the same type and belonging to the same batch of manufacture shall constitute a lot.

5.4.1.2 For ascertaining conformity of the material to the requirements of the relevant material specification, samples shall be tested from each lot separately.

5.4.1.3 The number of cakes to be tested from a lot shall depend on the size of the lot as given in col 1 and shall be in accordance with col 2 and 3 of Table 3.

Table 3 Number of Cakes to be Selected

(*Clauses* 5.4.1.3 *and* 5.4.2.2)

No of Cakes in the Lot	Sample Size	
	For Visual and Mass	Chemical Analysis
N	n_1	n_2
(1)	(2)	(3)
Up to 100	3	3
101 to 300	5	3
301 to 500	8	6
501 and above	13	9

5.4.1.4 The cakes shall be selected from the lot at random. In order to ensure the randomness of selection, procedures of simple random sampling or systematic sampling as given in IS 4905 : 1968 may be followed.

5.4.1.5 The number of cakes given under col 2 and 3 combined together (that is $n_1 + n_2$) shall be selected at random from a lot and then randomly divided into two groups so that the number of cakes given in Col. 2 and 3 are obtained separately.

5.4.2 *Test Samples and Referee Samples*

5.4.2.1 The cakes selected from the lot according to **5.4.1.3** as given under col 2 of Table 2 shall constitute test samples for visual requirements and mass.

5.4.2.2 For each of the cakes selected from the lot according to col 3 of Table 3, the individual sample for testing moisture content shall be prepared according to the procedure given in **5.4.2.3** and **5.4.2.4**.

5.4.2.3 In case of cakes weighing up to 400 g, the contents shall be cut into small pieces with the help of a clean, dry scissor or a sharp edged knife and further ground in an electrically driven dry blender, taking care that sample temperature does not rise above 45°C in the entire operation. From this, the quantity of material required for testing moisture content shall be taken so as to constitute the individual moisture sample.

5.4.2.4 The cakes of over 400 g shall be sliced uniformly into thin pieces with the help of a sharp edged knife and then two slices from the centre and two from each end shall be taken, leaving the outermost end slices. Afterwards the procedure as prescribed in **5.4.2.3** shall be followed.

5.4.2.5 The remainder of the material for each sample cake (*see* **5.4.2.3** and **5.4.2.4**) selected from a lot shall be mixed together so as to constitute the composite sample which shall be sufficient to carry out the tests for remaining requirements such as acidity of extracted fat and acid insoluble ash, as given in the specification.

5.4.3 *Number of Tests*

5.4.3.1 All the test samples of cakes (*see* **5.4.2.1**) shall be examined for visual requirements and mass as given in the relevant specification.

5.4.3.2 The moisture content shall be tested on each of the individual moisture sample (*see* 5.4.2.2).

5.4.3.3 Tests for remaining requirements such as acidity of extracted fat and acid insoluble ash shall be conducted on the composite sample (*see* **5.4.2.5**).

5.4.4 *Criteria for Conformity*

The lot shall be declared as conforming to the requirements of the relevant material specification, if the following are satisfied.

5.4.4.1 For visual requirements and mass, the test results on samples according to **5.4.2.1** shall meet the corresponding specification requirements.

5.4.4.2 For moisture content, each of the test results on individual moisture sample obtained according to **5.4.2.2** shall meet the corresponding specification requirement.

5.4.4.3 For remaining requirements such as acidity of extracted fat and acid insoluble ash all the test results on the composite sample shall meet the relevant specification requirements.

ANNEX A

(*Clause* 2.1)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
IS 498 : 1970	Grading for vacuum pan sugar (plantation white) (*third revision*)
IS 1011 : 1981	Biscuits (*second revision*)
IS 1151 : 1969	Specification for refined sugar (*first revision*)
IS 1320 : 1972	Specification for baker's yeast (*first revision*)
IS 2491 : 1972	Code for hygienic conditions for food processing units
IS 4905 : 1968	Methods of random sampling
IS 5059 : 1969	Code for hygienic conditions for large scale biscuit manufacturing units and bakery units
IS 5982 : 1970	Plantation white sugar for identification from other sugars
IS 7463 : 1988	Wheat flour for use by biscuit industry (*revised*)
IS 7464 : 1974	Specification for wheat flour for use in bread industry
IS 9194 : 1979	Specification for wheat flour for use by cake industry
IS 10633 : 1986	Vanaspati (*first revision*)
IS 10634 : 1986	Bakery shortening (*first revision*)

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